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Two New Species of Geranium in Japan.

by

J. Matsumura.

Geranium shikokianum, Matsum. sp. nov.

Planta usque 64 cm. alta. Radix...Multicaulis, suberectus; caulis ad nodos subincrassatus, sursum pilis patentibus v. subreflexis vestitus, glandulis nullis, deorsum glabrescens lucidus. Folia radicalia........., caulina longe petiolata, petiolis usque 18 cm. longis sursum hirsutis, stipulis ampliis connatis membranaceis, badiis late ovatis v. ellipticis, obtusis v. cuspidatis saepe sublobatis, glabris margine saepe ciliolatis; lamina ambitu reniformia, ultra medium palmato- 5–7- fida v. partita, segmentis cuneatis, acutis, 2–3-incisis, supra adpresso-puberula, subtus ad venas parce hirsutula. Pedunculi folia mutities superantes usque 10 cm. longi, pilis patentibus v. subreflexis vestiti, pedicellis fructiferis declinatis, usque $2\frac{1}{2}$ cm. longis, bracteis membranaceis lineari-oblongis obtusis v. acutis glabris instructi. Flores magni; sepala oblonga, aristata, 5–nervia, extus parce puberula v. glabrescentia, intus glabra, 9 mm. longa, 4 mm. lata; petala sepalis duplo longiora, obovata, roseo-purpurea, 7–nervia, integra v. cuspidata, 2 cm. longa, prope basin ciliata v. plus minus barbata. Filamenta dilatata stylos subaequantia, partibus dilatatis ciliatis; antherae ellipticae glabrae. Ovarium hirsutum, stylis liberis, fere a basi ad apicem stigmatosis. Fructus usque 28 mm. longus, valvis puberulis, apice basique longe ciliato-barbatis. Semina ellipsoidea, opaca, minutissime impressopunctata.

A. *G. Sieboldi,* Maxim. indumento, stipulis ampliis connatis facile distinguenda.

Hab. in Japonia: insula Shikoku, montibus Ishizuchi et Tebako leg. S. Yano anno 1890. Fl. et fr. Augusto.

Geranium hakusanense, Matsum. sp. nov.

Planta 37 cm. altà, Radix...... Caulis suberectus, angulatus sub lente pilis minutis adpresso-reflexis conspersus. Folia radicalia......, caulina modice, superiora brevissime petiolata, petiolis patentibus, subcanescentibus, stipulis

ovatis acutis herbaceis, glabrescentibus integerrimis; lamina ambitu reniformia, fere ad basin palmato-5-partita, segmentis cuneatis acute angusteque 3-5-incisis, laciniis ultimis lanceolatis acutis, supra minutissime puberula, subtus pallidiora ad venas tantum adpresse hirsutula. Pedunculi folia multo superantes, pedicellis fructiferis cernuis, bracteis ovatis acuminatis instructi. Flores $3\frac{1}{2}$ cm. in diametro; sepala oblonga v. ovato-elliptica, aristata, 6-nervia, extus ad nervos adpresse puberula, intus glabra; petala purpurea, sepala multo superantia, obovata, integra, intus ad basin barbata, supra basin pilosa. Filamenta basi abrupte dilatata ciliata, stylos subaequantia; antherae ellipticae. Ovarium villosum, stylis liberis tantum supra medium stigmatosis. Fructus $3\frac{1}{2}$ cm. longus, valvis puberulis, apice basique hirsutis. Semina ovalia, opaca, minutissime impressopunctata. *G. pratense*, Iinuma Soomoku-zusetsu XII, t. 45. (Hakusan-fūro). A. *G. Sieboldi*, Maxim. cui affinis, differt foliorum laciniis acutioribus, caulibus foliisque fere glabrescentibus, stipulis connatis majoribus, petalis pilosis.

Hab. in japonia: prov. Shinano, monte Asama leg. C. Owatari anno 1894. Fl. et fr. Augusto.

Observations on the Flora of Japan.

(*Continued from p.* 118.)

By

T. Makino,

Assistant in the Botanical Institute, Science College, Imperial University of Tokyo.

Rumex (Lapathum) **Daiwoo** (Sieb.) Makino nom. nov.

Robust perennial, attaining about $1\frac{2}{3}$ m. in height. Roots thick, yellow. Stem stout, erect, simple, flexuous, striato-sulcate, fistulous, glabrous, but often pubescent under the nodes, often tinged with rose-purple colour. Leaves alternate, ample, petioled, gradually diminishing in size and transferring into bracts, oblong-ovate, but ovate-lanceolate in the above ones, broadly ovate to ovato-oblong in the radical ones, obtuse or acutish, broadly

cordate to rounded at the base, irregularly more or less waved and crispate, herbaceous, glabrous above, scabrous-pubescent along veins and veinlets beneath, the largest one attaining about 47 cm. long, 28 cm. broad ; the midrib stout, prominent beneath ; veins numerous, patulous ; veinlets reticulated ; petiole shorter than the blade in the cauline leaves, but in the radical leaves very slender and often longer than the blade ; ochrea membranaceous, longitudinally nervate, 1–7 cm. long. Panicle loose, formed by the terminal and axillary slender racemes ; rachis slender, erect, more or less flexuous, striate, sometimes abbreviated, often puberulent, pubescent below the nodes ; verticels densely flowered, about 1–$2\frac{1}{2}$ cm. across, usually interruptedly remote one another, but often approximate in the superior ones, the lower verticels bracteate ; bract leaf-like, linear to lanceolate, shortly petiolate, obtuse, or acutish, acute at the base, more or less crispate on the margin, $2\frac{1}{2}$–8 cm. long. Flower small, green, about 4–$4\frac{1}{2}$ mm. in diameter ; pedicels filiform, horizontally patent and usually slightly arcuate downwards ; sometimes coherent below, unequal in length, about 3–8 mm. long. Outer perianth 3, patent, glabrous, herbaceous, connate at the base ; lobes oblong, very concave within, rounded-obtuse on the back, obtuse at the apex, entire and subdiaphano-membranaceous on the margin, $1\frac{1}{2}$–2 mm. long, persistent and then shaded with rose-colour towards the margin and apex. Inner perianth 3, erect-patent, longer than the outer ones, glabrous, herbaceous ; lobes broadly oblong, obtuse, membranaceous and more or less minutely erose on the margin, with anastomosing veins, $2\frac{1}{2}$–3 mm. long, after anthesis gradually enlarged and tinged with rose-colour, in fruit deltoid-ovate to ovate-reniform, minutely denticulate on the margin, obtuse, subcrispate, reticulated-veined, 4–8 mm. wide, the midrib narrowly prominent below but not calliferous, or sometimes hardly and minutely unicalliferous. Stamens 6, equalling the inner perianth in height ; filament linear-filiform, glabrous, white, shorter than the anther ; anther oblong-linear, obtuse at the inferior end, obtuse and hardly bifid at the superior end, basifixed, yellow. Ovary minute, included, yellow-viridescent, triquetrous-globose, glabrous, nearly 1 mm. long ; styles 3, erect-patent, shorter than the ovary ; stigma densely tufted, white ; ovule solitary, erect, very minute. Seeds narrowly ovate, triquetrous, tapering above, brown, shining, mainly sterile.

Lapathum Daiwoo Siebold Synops. Pl. Oeconom. Jap. in Verh. Bat. Gen. XII. 1830, p. 19.

Rumex Madaio Makino in Bot. Mag., Tokyo, X. 1896, p. 107.

Rumex aquaticus ? β. japonicus Meisn. in Ann. Mus. Bot. Lugd.-Bat. II. p. 55 ; Franch. et Sav. Enum. Pl. Jap. I. p. 392, non II. p. 470.

Hab. Prov. Tosa: Kitagawa in Nanokawa (*K. Watanabe*! June 9, 1888), Nanokawa (*K. Watanabe*! May 18, 1889), Sakawa (*T. Makino*! 1892, June 1893), Ananai, cult. (*T. Makino*! June 2, 1892); Prov. Musashi: Tokyo, Bot. Gard. Sc. Coll. Imp. Univ., cult. (*T. Makino*! June 1900); Prov. Shimotsuke: Chūzenzi, etc. in Nikkō (*T. Makino*! July 1900); Prov. Shinano: Goryō (*R. Yatabe* and *Z. Matsumura*! Herb. Soc. Coll. Imp. Univ. Tokyo, July 19, 1880).

An allied species of *Rumex domesticus* Hartm. and *R. aquaticus* Linn., principally distinguished by its interruptedly remote verticels; sparingly distributed over Japan, commonly growing on sides of mountain rivulets, and sometimes cultivated. The root is sometimes employed as a drug by the rustics.

Rumex domesticus Hartm.; Spreng. Syst. Veg. II. p. 161; Chamiss. et Schlecht. in Linnæa III, p. 56; Chamiss. in Ibidem, VI. p. 591; Peterm. Deutschl. Fl. p. 486; Nyman Syll. Fl. Europ. p. 326; Hook. et Arn. Bot. Beechey's Voy. p. 129; Hook. Fl. Bor. Amer. II. p. 129; Ledeb. Fl. Alt. II. p. 60; Id. Fl. Ross. III. p. 506; Koch Syn. Fl. Germ. et Herv. ed. 3, p. 531; Sowerby's Eng. Bot. ed. 3, VIII. p. 50, tab. MCCXIX; Fr. Schm. Reis. im Amurl. u. Ins. Sachal. p. 167; Herd. Pl. Radd. in Act. Hort. Petrop. XI. p. 191.

Rumex Hippolapathum α. domesticus Fries.

Rumex crispus β. domesticus Weinm.

Rumex longifolius "DC." Meisn. in DC. Prodr. XIV. p. 44.

Rumex alpinus Willd. herb. ex Spreng.

Rumex aquaticus β. crispatus Wahlenb.

Rumex aquaticus Hook.; Benth. Handb. Brit. Bot. ed. 5, p. 380; Makino in Bot. Mag., Tokyo, X. p. 108, non Linn.

Rumex aquaticus var. japonicus Franch. et Sav. Enum. Pl. Jap. II. p. 470, non Ibidem I. p. 392, et nec Meisn.

Hab. Prov. Musashi: Shimura (*T. Makino*! May 22, 1898); Prov. Rikuchū: Near Itsukushi (*T. Makino*! Aug. 1890); Prov. Shinano: Mt. Togakushi (*R. Yatabe* and *Z. Matsumura*! Herb. Sc. Coll. Imp. Univ. Tokyo, July 10, 1884); Prov. Iwashiro: Foot of Mt. Bandai (*Z. Matsumura*! Herb. l. c. Aug. 1879), Aidzu (*Z. Matsumura*! Herb. l. c. Aug. 17, 1879); Prov. Hidaka: Saruru (*Y. Tokubuchi*! Herb. l. c. Aug. 12, 1892) Horoidzumi (*Y. Tokubuchi*! Herb. l. c. Aug. 20, 1892).

This species is found in the middle and northern Japan.

Pedicularis (Anodontæ, Sceptra) **nipponica** Makino in Bot. Mag., Tokyo, IX. 1895, p. 72.

Robust perennial, attaining about 10 decim. in height, with a stout and often ramose inflorescence and a stout and short stem. Stem terete, pubescent, leafy. Leaves opposite, placed towards the base of the plant, with a petiole which is dilated at the base, but sessile and clasping the stem in the upper ones, oblong or oblong-lanceolate, acuminate, rather shortly narrowed below, bipinnatifid, broadly winged on both sides of the rachis, glabrous, but pubescent along the rachis in the upper surface, the superior ones smaller in size and connate at the base, the largest one attaining 40 cm. or more in length and about 16 cm. in breadth; pinnæ numerous, patent, alternate, lanceolate, attaining about $3\frac{2}{3}$ cm. wide, acuminate, with numerous deltoid-lanceolate and taperingly pointed lobes which are argutely serrate with simple or serrulate teeth, largest in the middle ones but gradually diminished below and at length into only serrated deltoid lobes; rachis prominent beneath, the wing irregularly dentate with serrulate teeth; veins of pinnæ numerous, straight or slightly arcuate. Inflorescence over-toping the leaves, loosely ramose, but occasionally simple; spike elongate, with stout and pubescent rachis; bracts numerous, alternate and sessile, but opposite and connate below in the inferior ones, deltoid-ovate, or orbicular-ovate, or elliptical, concave, acute or obtuse, inciso-serrate with serrulate teeth, many or several-veined, with fine and reticulated veinlets between veins, pubescent with glandular and several-cellular hairs, $\frac{2}{3}$–4 cm. long but the inferior ones often larger and leaf-like with broad and connate bases, persistent. Flowers closely disposed, erect-patent, very shortly pedicellate or nearly sessile, subtended by the bract which much shorter than the flower, 4–5 cm. long, rose-coloured. Calyx campanulate, sometimes tubuloso-campanulate, 9–15 mm. long, sparingly pubescent and ciliated with glandular and several-cellular hairs; the tube membranaceous, with 5 nerves each running to the limb-lobes accompanied by usually a weak vein between them, with reticulated and delicate veinlets above; the limb usually 5-lobed, with rounded sinuses between lobes, the lobes about one-thirds as long as the calyx-tube, ovate or ovate-lanceolate, acute, pluriserrate or subinciso-serrate excepting its very base, thicker than the tube. Corolla about $3\frac{1}{2}$-times as long as the calyx, bilabiate, splitting down to the middle, deciduous; the tube more or less attenuated below, hairy partly below the lower lip internally; the upper lip erect, slightly arcuate inwards and subgaleate, with an obtuse end, pubescent with many-cellular hairs on both front margins; the lower lip ample and equalling the upper lip in length,

spreading, 3–lobed, the lobes entire, equalling in size and height, close-placed so that their lateral edges overlap one over another. Stamens 4, sub-didynamous, inserted to the lower portion of the corolla-tube, very slightly lower than the corolla in height and enclosed within its upper lip; filament long, filiform, glabrous excepting the very base which is pubescent; anthers coherent in pair, ovate, with oblong parallel celles and a thickish connective. Ovary oblong-ovate, a little oblique, acute at the apex, shorter than the calyx; style slender, filiform, hamate-arcuate in the apical portion, glabrous; stigma more or less capitellate. Capsule very shortly pedicellate, accompanied by the splitting persistent calyx and bract, ovate, tapering above and suddenly hooked downwards with the basal remainder of the style, slightly compressed, glabrous, about $1\frac{3}{4}$ cm. long; carpels 2, thin and coriaceous. Seeds numerous, with loose and cellular coat.

Hab. Prov. Echigo: Mt. Shimidzu-tōge (*T. Makino*! Sept. 1888).

A very conspicuous species among the Japanese *Pedicularis*; and much more robust than the *Pedicularis gloriosa* Bisset et Moore, which exhibits a close affinity to my species.

Eria reptans (Franch. et Sav.) Makino nom. nov.

Dendrobium reptans Franch. et Sav. Enum. Pl. Jap. II. p. 511.

Eria japonica Maxim. in Mél. Biol. XII. p. 545.

Hab. Prov. Tosa: Mt. Hōnokawa (*T. Makino*! Aug. 10, 1887); Prov. Hyūga: Mt. Kirishima (*R. Yatabe* and *Z. Matsumura*! Herb. Sc. Coll. Imp. Univ. Tokyo, Aug. 3, 1882); Prov. Kii: Mt. Nachi (*M. Miyoshi*! Herb. l. c. Aug. 18, 1887).

Arisæma (Pedatisecta) **serratum** (Thunb.) Schott, emend.

Forma a. Thunbergii Makino.

Arisæma serratum Schott, 1832; Ejusd. Prodr. Syst. Aroid. 1860, p. 41; Blume in Rumphia I. 1835, p. 107; Kunth. Enum. Pl. III. p. 19; Miq. Prol. Fl. Jap. p. 134, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. p. 96; Franch et Sav. Enum. Pl. Jap. II. p. 5; N. E. Brown in Journ. Linn. Soc. XVIII. p. 252.

Arum serratum Thunb. in Trans. Linn. Soc. II. p. 338; Ejusd. Ic. Pl. Jap. Decas IV. tab. 7; Pers. Syn. Pl. II. p. 574; Willd. Sp. Pl. IV. p. 479; Spreng. Syst. Veg. III. p. 770.

Arisæma japonicum β. serratum Engl. in DC. Monogr. Phanerog. II. p. 549.

Arisæma latisectum Oliv. in herb. Oldham ex Miq. non Bl.

Arisæma angustatum Franch. et Sav. Enum. Pl. Jap. II. pp. 6, 507; Engl. in DC. Monogr. Phanerog. II. p. 560; N. E. Brown in Journ. Linn. Soc. XVIII. p. 251.

Forma b. Blumei Makino.

Arisæma japonicum Blume in Rumphia I. p. 106; Schott Prodr. Syst. Aroid. p. 40; Kunth Enum. Pl. III. p. 19; A. Gray in M. C. Perry's Exped. p. 319; Miq. Prol. Fl. Jap. p. 134, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. pp. 95, 159; Savat. Liv. Kwa-Wi p. 59; Franch. et Sav. Enum. Pl. Jap. II. p. 5; N. E. Brown in Journ. Linn. Soc. XVIII. p. 252; Engl. in DC. Monogr. Phanerog. II. p. 549; Ejusd. in Engler's Bot. Jahrb. VI. p. 52; Ejusd. in Engl. et Prantl Natür. Pflanzenfam. II. 3, p. 151; Ejusd. in Diels Fl. Centr.-Chin. in Engler's Bot. Jahrb. XXIX. p. 236.

Arisæma latisectum Blume in Rumphia I. p. 110; Schott Prodr. Syst. Aroid. p. 55; Kunth Enum. Pl. III. p. 21; A. Gray Bot. Jap. p. 408; Miq. Prol. Fl. Jap. p. 134.

Arisæma japonicum var. latisecta Miq. Prol. Fl. Jap. p. 357.

Arisæma japonicum var. angustifoliolata Miq. Prol. Fl. Jap. pp. 134, 357, et Cat. Mus. Bot Lugd.-Bat., Fl. Jap. p. 95.

Arisæma japonicum var. latifoliata Schott ex Miq. Cat. Mus. Bot. Lugd.-Bat. p. 95.

Arisæma amplissimum Blume in Rumphia I. p. 110; Schott Prodr. Syst. Aroid. p. 56; Kunth Enum. Pl. III. p. 21; Miq. Prol. Flor. Japon. pp. 134, 357, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. p. 95; Franch. et Sav. Enum. Pl. Jap. II. p. 6; Engl. in DC. Monogr. Phanerog. II. p. 560.

Arum Dracunculus Thunb. Fl. Jap. p. 233, non Linn.

Nansoo, vulgo *Jamma Konjakf*, it. *Osomi*, Medic. *Ten nan sio* Kæmpf. Amœn. Exot. p. 786.

Hab. Prov. Tosa: Mt. Yokogura (*T. Makino*! May 1889, forma a, b), Ishigami-tō in Mt. Torigata (*T. Makino*! May 22, 1889, forma b), Ōmoto in Ogawa-mura (*T. Makino*! Nov. 1891, forma b); Prov. Musashi: Chichibu (*R. Yatabe* and *Z. Matsumura*! Herb. Sc. Coll. Imp. Univ. Tokyo, April 24, 1878, forma a, b); Nobitome (*T. Makino*! May 13, 1894, forma a, b), Kami-shirane (*T. Makino*! June 6, 1901, forma a), Mt. Mitake (*Z. Matsumura*, *S. Matsuda*, and *Y. Yabe*! Herb. l. c. May 15, 1900, forma a); Prov. Sagami: Ubago in Hakone (Herb.! l. c. Aug. 24, 1885, forma a, leaf-segments angustato-lanceolate, narrowly acuminate with a very sharp point, irregularly denticulate, thickish in texture, the middle one shortly petiolulate, the rest sessile), Tōnosawa in Hakone (*T. Makino*! April 12, 1901, forma

a, b), Mt. Ōyama (*Z. Matsumura* and *S. Matsuda*! Herb. l. c. May 18, 1900, forma a, b); Prov. Hitachi: Mt. Tsukuba (*T. Makino*! April 5, 1894, forma b, May 1897, forma a, b, May 27, 1900, forma a); Prov. Awa (Bōshū): Mt. Kiyosumi (*T. Makino*! April 1896, forma b); Prov. Suruga: Mt. Fuzi (*R. Yatabe* and *Z. Matsumura*! Herb. l. c. July 25, 1881, forma a; *S. Matsuda*! July 28–31, 1891, forma a); Prov. Shimotsuke: Nikkō (Herb! l. c. Oct. 8, 1878, forma a; *T. Makino*! June 1901, forma a, b), Umagaeshi in Nikkō (*S. Ōkubo*! Herb. l. c. May 17, 1889, forma b), Mt. Kōnosu-yama (*S. Ōkubo*! Herb. l. c. May 21, 1889, forma b), Koshiro-mura near Nikkō (*S. Ōkubo*! Herb. l. c. May 18, 1889, forma a), Tanzei-yama (*K. Sawada*! Herb. l. c. June 19, 1878, forma b); Prov. Shinano: Mt. Togakushi (*R. Yatabe* and *Z. Matsumura*! Herb. l. c. July 12, 1884, forma b); Prov. Kaga: Yumoto in Mt. Hakusan (*R. Yatabe* and *Z. Matsumura*! Herb. l. c. Aug. 6, 1881, forma b); Isl. Kyūshū [Kiusiu] (Herb.! l. c. May 1879, forma b); Prov. Yamato: Mt. Kasuga (*Z. Matsumura* and *S. Ōkubo*! Herb. l. c. July 13, 15, 1883, forma b); Prov. Idzu: Mt. Ōmuro (*S. Ōkubo*! Herb. l. c. June 4, 1883, forma a), Sendzu in Isl. Ōshima (*S. Ōkubo*! Herb. l. c. April 17, 1887, forma b), Kashidate-mura in Isl. Miyake (*S. Ōkubo*! Herb. l. c. May 8, 1887, forma b), Ōka-gō in Isl. Hachidyō (*S. Ōkubo*! Herb. l. c. May 1887, forma b); Prov. Suō: Yamaguchi (*D. Nikai*! Herb. l. c. May 14, 1893, forma b); Hokkaidō (*L. Boehmer*! Herb. l. c. forma b); Prov. Ishikari: Sapporo (*K. Miyabe*! Herb. l. c. June 1880, forma b).

A common and widely distributed species on hills, mountains and in forests of Japan. The colour and maculation of the petiole and the colour of the spathe are variable. Leaves either entire or serrate or sometimes in the intermediate state; such difference of the leaf-margin is not an important character of this species, and this condition also prevails largely in some other Japanese species of the same genus.

There is a robust species on Mt. Imano in the southern part of Isl. Shikoku. Its fruit is conical; and berries are large and measure $1\frac{1}{3}$–$1\frac{1}{2}$ cm. or more across, and scarlet when mature; and the rachis is dark-purple. The leaves are entire and pedatisected as those of *Arisæma japonicum* Bl. It may be a new species and I like to give it a new name *Arisæma macrocarpon* mihi.

Arisæma (Pedatisecta) **tosaense** Makino sp. nov.

Corm depressed-globose, densely rooting at the neck. Cataphylls membranaceous, the superior one narrowed above, cylindrically encircled the lower portion of petioles. Leaves 2, but rarely 1, long-petiolate, the inferior one

larger, pedatisected; segments 9–19 in the inferior leaf, and 7–13 in the superior leaf, oblong, oblong-lanceolate, or lanceolate, elliptical-lanceolate, or sometimes obovato-oblong, acuminate with a narrowly tapering point, entire or denticulate, membranaceous, the middle one largest, petiolulate, cuneate at the base, that of the inferior leaf 4–10½ cm. wide, 15–32 cm. long including the petiolule, the rest sessile and gradually decreasing in size outwards; veins delicate, numerous, erect-patent, connecting with an intramarginal vein; petiole erect, vaginate beyond the middle, pallid-green, 20–40 cm. or more long, the free portion about 1–7 cm. long in the superior leaf and 8–12 cm. long in the inferior leaf. Peduncle lower than the leaves, or sometimes equalling or rarely more or less exceeding them, erect, the free superior portion ½–10½ cm. or rarely about 17 cm. in length. Spathe erect; the tube convolute and tubuloso-infundibuliform, pallid-green, 5–6½ cm. long, the mouth abruptly truncate and with recurved margins; the limb fornicately incurved, ovate, oblong-ovate, or lanceolate-ovate, gradually attenuated above into a long slender tail longer than the tube, 13–32 cm. long, thin, pallid-green. Spadix unisexual, subconico-cylindrical, subsessile, nearly 2 cm. long, many-flowered; the appendage erect, much longer than the spadix, exceeding the mouth of the spathe-tube, shortly stipitate, cylindrical-clavate with a rounded apex, truncate at the base. Male flowers shortly stipitate, 4–6-androus. Female flowers sessile; ovary obovate, with a minute and sessile stigma at the top.

Hab. Prov. Tosa in Isl. Shikoku: Mt. Yokogura (*T. Makino*! June 4, 1887, June 1893); Idzumi at foot of Mt. Torigata (*T. Makino*! May 22, 1889).

This species is found in Isl. Shikoku as quoted above. It is allied to *Arisæma serratum* Schott (incl. *A. japonicum* Bl.), distinguished principally from the latter by the colour of the petiole and spathe, and long caudate spathe-limb. Leaves occur in either entire or denticulate state, as in those of *Arisæma serratum* Schott (including *A. japonicum* Bl.), *A. amurense* Maxim. and *A. Sazensoo* Makino (=*A. sikokianum* Franch. et Sav.).

Arisæma (Pedatisecta) **amurense** Maxim. Prim. Fl. Amur. p. 264; Engl. in DC. Monogr. Phanerog. II. p. 549; Korshins. in Act. Hort. Petrop. XII. p. 392.

Corm depressed-globose, turioniferous; turiones globose, about pea-sized. Cataphylls thinly membranaceous. Leaves tall, 2, or sometimes 1, long-petiolate, radiately pedatisected with 5– (rarely 6–) segments; segments ovate-oval to obovato-lanceolate, acuminate or shortly acuminate, entire (*forma a.*

integrifolium), or irregularly serrato-denticulate (*forma b. denticulatum*), the middle one usually slightly larger and shortly petiolulate and cuneate towards the base, the rest sessile and a little confluent at the base, green; veins erect-patent; petiole long-vaginate, pallid-green. Spathe pallid-green, the limb fornicate-incurved, ovato-lanceolate. Spadix unisexual, the floriferous portion about $1\frac{1}{4}$–$1\frac{1}{2}$ cm. long; appendage erect, shortly stipitate, cylindrical, clavate above, truncate below, a little higher than the spathe-tube. Male flowers 2–4–androus. Berries scarlet, the rachis thick and conical.

Hab. Prov. SHIMOTSUKE: Mt. Nikkō (Herb.! Sc. Coll. Imp. Univ. Tokyo, Oct. 8, 1879; *T. Makino*! June 1901), Mt. Kōshinzan (*T. Makino*! Sept. 12, 1901); Prov. UZEN: Mt. Yudono (*R. Yatabe* and *S. Ōkubo*! Herb. l. c. July 23, 1887); Prov. ECHIGO: Mt. Godzu (*R. Yatabe* and *S. Ōkubo*! Herb. l. c. Aug. 2, 1886).

This inhabits the middle and northern parts of Japan. The colour of the whole plant, the leaves of 5-segments, and the turioniferous corm, are the principal characters separating this from *Arisæma serratum* Schott and *A. japonicum* Blume.

Arisæma (Pedatisecta) **Sazensoo** (Buerg.) Makino nom. nov.

About 3–$6\frac{1}{2}$ decim. in height. Corm depressed-globose. Cataphylls thinly membranaceous, the superior one tubular below, lanceolate above. Leaves 2, the lower one larger, long-petioled, pedatisected with 5-segments, but with 3-segments in the insufficiently grown one, semicircular in the outline; segments ovato-oblong, obovate-oblong, obovato-elliptical, obovato-oval, broadly oval, or broadly ovate, shortly acuminate or cuspidate-acuminate, or sometimes mucronate, cuneate and at length decurrent towards the base, but the outermost one often obtuse at the base, entire (*forma a. integrifolium*), or irregularly or erosely denticulato-serrate or dentate-serrate or coarsely dentate (*forma b. serratum*), often albido-maculate along the midrib in the upper surface; the middle segment usually largest, equal in the base, furnished with a petiolule $\frac{1}{2}$–2 cm. long, or rarely subsessile, 2–$15\frac{1}{2}$ cm. wide, 6–26 cm. long including the petiolule; lateral segments more or less unequal at bases, the outermost one smallest in size; veins about 8–16 on each side, erect-patent, straight or more or less arcuate and connected with the intramarginal vein; veinlets finely anastomosing, not conspicuous superficially; petiole cylindrically long-vaginate, obliquely or straightly truncate at the mouth, the upper free portion slender, 7–15 cm. long in the superior one and 8–18 cm. long in the inferior one. Peduncle usually lower than leaves, the upper naked portion 2–10 cm. in length. Spathe erect; the tube convolute

and tubuloso-infundibuliform, thickly membranaceous, dark-purple, 4–6 cm long, the mouth truncate and spreading with entire and whitish margins; the limb a little forniculate-incurved and then erect above, longer than the tube, obovato-oblong to oblong-lanceolate, gradually attenuated above and narrowly acuminate; entire, dark-purple externally and whitish internally, thickly membranaceous, longitudinally veined, 10–18 cm. long, 3–5½ cm. broad. Spadix unisexual, subconico-cylindrical, subsessile, many-flowered, 1½–3 cm. long; the appendage exceeding the spathe-tube, erect, shortly stipitate, subtruncate at the base, cylindrical below, large and globoso-clavate above and white, 3–6¼ cm. long including the stipe. Male flowers minute, rather laxly disposed, shortly stipitate, 2–4–androus. Female flowers densely placed, sessile; ovary obovate, 1–celled, with a minute and sessile stigma at the top; ovules 3–4. Fruit conico-oblong, the surface of the rachis darkish purple; berries numerous, roundish-obconical, sessile, scarlet; seeds 1–2 or 3, ovoid, smooth, stipitate; albumen copious; embryo straight, cylindrical.

Arum Sazensoo Buerg. ined. ex Blume in Rumphia I. 1835, p. 107.

Arisæma japonicum β. Sazensoo Blume l. c.; Kunth Enum. Pl. III. p. 19; Miq. Prol. Fl. Jap. p. 134, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. p. 95; Franch. et Sav. Enum. Pl. Jap. II. p. 5.

Arisæma amurense γ. Sazensoo Engl. in DC. Monogr. Phanerog. II. p. 550.

Arisæma sikokianum Franch. et Sav. l. c. II. pp. 6, 507; Engl. l. c. p. 560; N. E. Brown in Journ. Linn. Soc. XVIII. p. 251; Makino in Bot. Mag., Tokyo, VII. p. 322, cum *var. β. serratum* Makino.

Nom. Jap. *Yukimochi-sō* (Iinuma's Sōmoku-Dzusetsu, XIX. tab. 17, three-leaflet form).

Hab. Tosa: Sakawa (*T. Makino*! May 1889, coarsely dentate-leaved form), Shashabu in Chōzya-mura (*T. Makino*! May 23, 1889, entire-leaved form), Kusugami at foot of Mt. Yokogura (*T. Makino*! June 1893, dentate-serrate-leaved form, denticulate-serrate-leaved form, and entire-leaved form); Prov. Iyo: Mt. Nakatsumyōzin (*K. Okudaira*! May 13, 1895, entire-leaved form); Prov. Hyūga: Mt. Kirishima (*R. Yatabe* and *Z. Matsumura*! Herb. Sc. Coll. Imp. Univ. Tokyo, Aug. 4, 1882, dentate-serrate-leaved form).

This species is found in the south-western or the warmer part of Japan, exhibiting an attractive appearance which is principally due to the large, snowy white, and globose-clavate appendage of the spadix. The leaves are commonly pedately divided into 5–segments in the normal state; but 3–segment-leaves are sometimes met with. The condition of the ternately

divided leaves are truly not the constantly fixed form, but is always replaced by the proper 5–segment form. Leaves of 5–segments have a close resemblance to those of *Arisæma amurense* Maxim., so that sterile specimens of the two are frequently confused with each other.

Arisæma (Pedatisecta) **heterophyllum** Blume in Rumphia I. p. 110; Schott Prodr. Syst. Aroid. p. 55; Kunth Enum. Pl. III. p. 20; Miq. Prol. Fl. Jap. p. 134, et Cat. Mus. Bot. Lugd.-Bat., Fl Jap. p. 95.; N. E. Brown in Journ. Linn. Soc. XVIII. p. 250; Makino in Bot. Mag., Tokyo, XI. 1897, p. 33.

Corm turioniferous; turiones globose, about pea-sized. The middle one of leaf-segments smaller than both lateral ones; petiole green, sparsely nigropunctate (in my living specimen). Inflorescence exceeding the leaves, the spathe green.

Arisæma Thunbergii β. heterophyllum Engl. in DC. Monogr. Phanerog. II. p. 546; Diels in Engler's Bot. Jahrb. XXIX. p. 236.

Arisæma Thunbergii Savat. in Iinuma's Somoku-Dzusetsu, ed. 2, XIX. tab. 14 (*Maidzuru-sō*), non Blume.

Hab. Prov. Musashi: Bot. Gard. Agric. Coll. Imp. Univ. Tokyo in Komaba, cultivated.

I have not found it yet in the wild state in Japan, but probably indigenous.

Arisæma (Trisecta) **ternatipartitum** Makino Notes on Jap. Pl. XV. in Bot. Mag., Tokyo. VI. 1892, p. 47.

Corm depressed-globose, with fibrous roots at the neck, turioniferous; turiones globose or conical. Cataphylls thinly membranaceous, maculate, loose, obtuse at the apex, the superior one tubular below, the mouth very oblique. Leaves 2, or rarely 1, long-petiolate, trisected with narrow sinuses; segments about equalling in size, sessile, acuminate, minutely scabro-serrulate, thin, green above, glaucous beneath, immaculate; the middle segment rhombeo-ovate, cuneate towards the base, 7–16 cm. long, 3–9 cm. broad; lateral segments more or less oblique in form, elliptical-ovate, or ovate, or broadly ovate, $6\frac{1}{2}$–16 cm. long, 3–$9\frac{1}{2}$ cm. wide; midrib prominent beneath; lateral-veins many, erect-patent, connecting by an intramarginal vein which is accompanied by an accessory vein closed to the margin; veinlets copiously anastomosing; petiole cylindrically vaginate below with an oblique mouth above, the free portion slender, about 7–21 cm. long, often longer than the vaginate portion. Peduncle erect, cylindrical, lower than

the leaves but often exceeding the leaves in flower. Spathe erect; the tube convolute and cylindrical-tubular, about 5 cm. long, dark-purple, the mouth suddenly truncate with auriculately dilated and revolute margins; the limb deltoid-ovate, or oblong-ovate, acute or more or less shortly acuminate, fornicato-deflected, dark-purple, about 6–8 cm. long. Spadix unisexual, conico-cylindrical, subsessile, $1\frac{1}{3}$–$1\frac{2}{3}$ cm. long, many-flowered; appendage shortly (about 8 mm. long) stipitate, exceeding the spathe-mouth, cylindrical-subclavate, thickish and abruptly truncate at the base, $3\frac{1}{2}$–4 cm. long exclusive of the stipe. Male flowers loosely disposed, shortly stipellate, 3–4-androus; anthers purple, with white pollen. Female flowers close-placed, obovato-globose, with a subsessile stigma at the top; ovules 8–15, obconical, arranged in a circular manner. Fruit oblong-conical; berries numerous, obovato-globose, scarlet, 6–10 mm. across; seed with a copious albumen and a straight and cylindrical embryo.

Hab. Tosa: Sakawa, cult. (*T. Makino*! 1885), Nanokawa (*K. Watanabe*! May 6, 1888), Mt. Yokogura (*T. Makino*! May 1892, June 1893), Hirose in Tosa-gōri (*S. Yano*! April 1891); Prov. Iyo: Mt. Shirae-goe (*K. Okudaira*! May 2, 1897), Mt. Ishidzuchi (*R. Yatabe*! Herb. Sc. Coll. Imp. Univ. Tokyo, Aug. 9, 1888).

This is found growing in forests in mountainous districts of south-western Japan.

Pinellia tripartita Schott **var. atropurpurea** Makino.

The limb of the spathe dark-purple internally.

Hab. Prov. Shimotsuke: Hachiishi in Nikkō, cultivated.

Rare; I have seen only one living specimen cited above. It is figured in Iwasuki's Honzō-Dzufu, XX. fol. 25 verso-26 recto.

Pinellia ternata (Thunb.) Breitenb. in Bot. Zeit. 1879, p. 687, figs. 1–4.

Arum ternatum Thunb. Fl. Jap. p. 233; Willd. Sp. Pl. IV. p. 481; Pers. Syn. Pl. II. p. 574; Breitenb. l. c.; Benth. Fl. Hongk. p. 342, in nota.

Arisæma ternatum Schott. 1832; Ejusd. Prodr. Syst. Aroid. p. 60; Zolling. Syst. Verz. Ind. Archip. I. 1854, p. 76.

Atherurus ternatus Blume in Rumphia I. p. 136; Kunth Enum. Pl. III. p. 54.

Pinellia tuberifera Tenore, 1830; Schott Prodr. Syst. Aroid. p. 20; Miq. Prol. Fl. Jap. p. 133, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. p. 95; Franch. et Sav. Enum. Pl. Jap. II. p. 3; Smith Contr. Mater. Med. et Nat. Hist Chin. pp. 149, 172; Hanb. Sc. Pap. p. 262; Bretschn. Bot. Sinic.

in Journ. Chin. Branch. Roy. Asiat. Soc., N. Ser. XXV. p. 239; Engl. in DC. Monogr. Phanerog. II. p. 566; Ejusd. in Engler's Bot. Jahrb. VI. p. 52; Ejusd. in Engl. et Prantl Die Natürl. Pflanzenfam. II. 3, p. 151; Ejusd. in Diels Fl. Centr.-Chin. in Engler's Bot. Jahrb. XXIX. p. 236; N. E. Brown in Journ. Linn. Soc. XVIII. p. 246; Franch. Pl. David. p. 313 (*var. subpandurata*).

Arum bulbosum Pers. ex Blume l. c.

Arum atrorubens Spreng. Syst. Veg. III. p. 769, ex parte, nec Ait.

Arum fornicatum Roth.

Hemicarpurus fornicatus Nees; Ejusd. in Linnæa XIV. Lit.-ber. p. 167.

Arum subulatum Desf.

Arisæma macrourum Bunge Enum. Pl. Chin. Bor. p. 67.

Typhonium? tuberculigerum Schott in Ann. Mus. Bot. Lugd.-Bat. I. p. 123; Miq. Prol. Fl. Jap. p. 134, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. p. 96; Franch. et Sav. l. c. p. 7.

Arum triphyllum Houtt. Natuur. Hist. XXIX. p. 183, ex parte, nec Linn.

Arum triphyllum Lour. Fl. Cochinch. ed. Willd. p. 652, non Linn.

Arisæma Loureiri Blume l. c. p. 108.

Hab. Prov. MUSASHI: Nobitome (*T. Makino*! May 13, 1894, the leaves are passed into *forma angustata*), Tokyo (*Z. Matsumura*; Herb. Sc. Coll. Imp. Univ. Tokyo, May 1878), Id. Bot. Gard. Koishikawa (*S. Ōkubo*! Herb. l. c. May 23, 1883, *forma angustata*), Kami-Itabashi (Herb.! l. c. May 11. 1879); Prov. IDZU: Yugashima (*S. Ōkubo*! Herb. l. c. June 4, 1883); Prov. UZEN: Near Hondōzi-mura (*R. Yatabe* and *S. Ōkubo*! Herb. l. c. July 20, 1887); Prov. IWASHIRO: Moniwa (*T. Makino*! Aug. 1890, the leaves are run into *forma angustata*); Prov. SUŌ: Ōchi-mura (*D. Nikai*! Herb. l. c. May 26, 1892); Loochoo: Isl. Okinawa (*Y. Tashiro*! Herb. l. c. April 1887).

Not uncommon to find the leaves transformed to those of the **forma angustata** (=*Pinellia angustata* Schott in Ann. Mus. Bot. Lugd.-Bat. I. p. 123; Miq. Prol. Fl. Jap. p. 133, et Cat. Mus. Bot. Lugd.-Bat., Fl. Jap. p. 95; Franch. et Sav. Enum. Pl. Jap. II. p. 3.=*Pinellia tuberifera β. angustata* Engl. in DC. Monogr. Phanerog. II. p. 567; N. E. Brown in Journ. Linn. Soc. XVIII. p. 246).

(*To be continued.*)